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A euryhaline fish, lost in the desert: The unexpected metapopulation structure of *Coptodon guineensis* (Günther, 1862) in the Sebkhah of Imlili

Un poisson euryhalin perdu dans le désert : structure métapopulationnelle inattendue de Coptodon guineensis (Günther, 1862) dans la Sebkhah d'Imlili

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ARTICLE INFO

Article history:

Received 4 August 2017

Accepted after revision 3 January 2018

Available online xxx

Keywords:

Tilapia

Conservation

Endangered species

ABSTRACT

Euryhaline Cichlid fish of the species *Coptodon guineensis* are present in different water holes situated in a dried depression in the desert in the extreme South of Morocco, the Sebkhah of Imlili. A genetic survey of this population, using complete sequences of the ND2 gene (mtDNA) and sixteen microsatellite loci, revealed that the fish in the sebkhah did not form a single population, but rather a metapopulation. This metapopulation structure may be regarded as good news from the point of view of the conservation of fish in the sebkhah. Although small individual populations may have short, finite life spans, the metapopulation as a whole is more stable, because immigrants from one population are likely to re-colonize the habitat, left open by the extinction of another.

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1. Introduction

The Sebkhah of Imlili is, like all sebkhahs, a dried depression in the desert. These depressions are erratically flooded by rainfall events, during which they become a short-lived endorheic salted lake, as the water table is

composed of salt water. The Sebkhah of Imlili is located in the extreme South of Morocco (23°17'30"–23°11'45"N; 15°56'41"–15°53'37"W) (Figs. 1 and 2), 40 km south of El Argoub, and 15 km east of the Atlantic Ocean. This shallow depression, less than 10 m in depth, is about 12 km long and 2.5 km wide, lying in a NNE–SSW general direction. It is surrounded by sand dunes and, mainly on the western and northern borders, plants form a narrow band, 20 to 30 m wide. In the northern part of the sebkhah, the sandy

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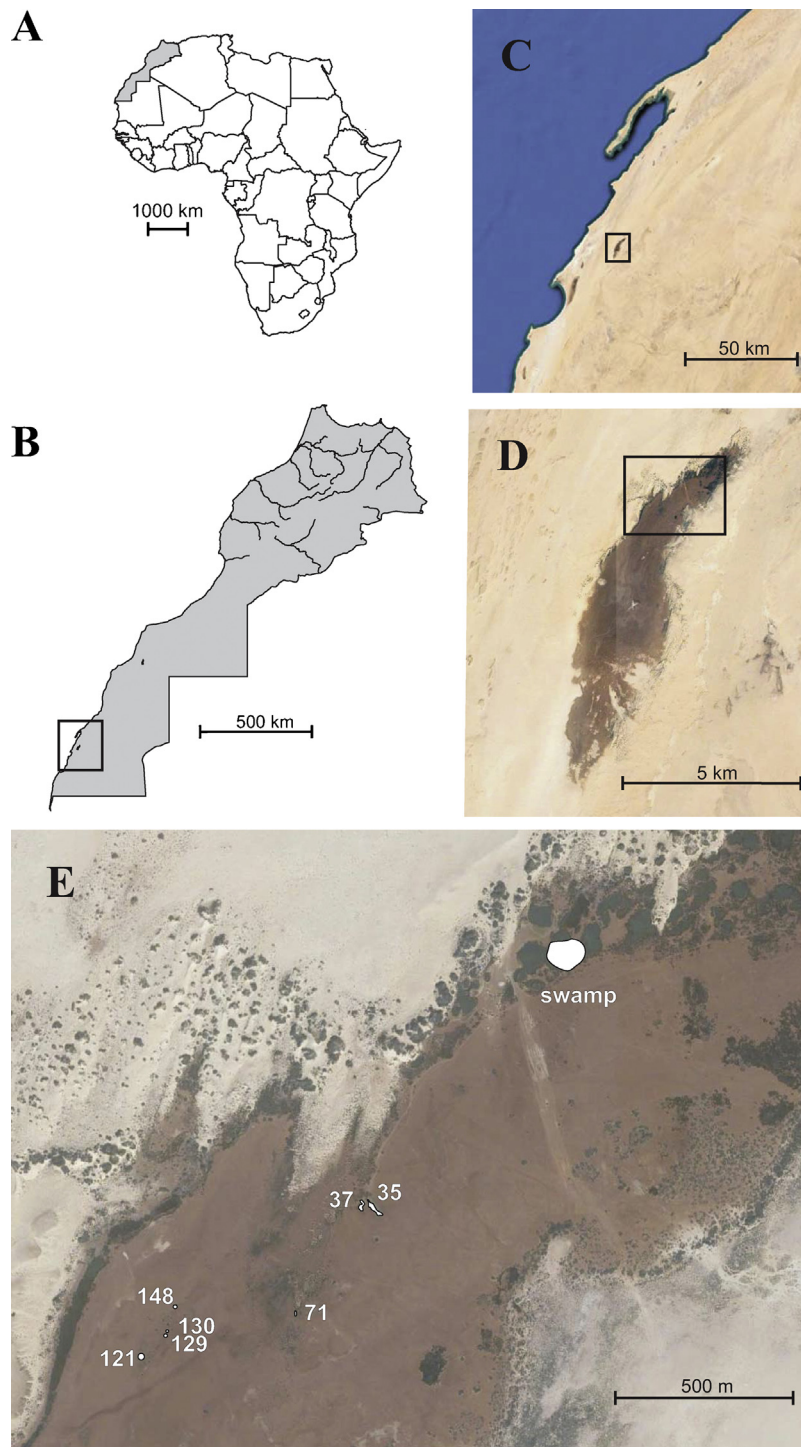


Fig. 1. Location of the sebkha of Imlili and of the water holes studied. A. Morocco. B and C. Area where the sebkha is located. D. Water holes area within the sebkha. E. The waters holes studied and swamp. Google Earth V7.1.8.3036 (16 January 2015).

soil is red, and is covered in the drier areas by a fine white powder corresponding to salt crystallisation. The most significant feature of this sebkha is the presence, especially on the western and northern borders, of 161 permanent water holes (Figs. 1 and 2). Their diameter varies between 0.5 m and 37 m, with depths ranging from 40 cm to 4.6 m.

Their bottom is sandy, and the borders have sand and salt concretions. The water supply to these holes is largely through small outbreaks that appear at the bottom where the water table intersects with, and moistens the soil of the sebkha. In some of these salty water holes (from 39 to 45 g/L), there are fish populations (Fig. 2). Initially identified as

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